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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NEURAUTER, GEORGE C	

ART UNIT	PAPER NUMBER
2143	

DATE MAILED: 07/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/980,920	KRAUSE ET AL.	
	Examiner	Art Unit	
	George C. Neurauter, Jr.	2143	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 June 2006 has been entered.

Response to Arguments

Applicant's arguments filed 15 June 2006 have been fully considered but they are not persuasive.

The Applicant has amended the claims to include wherein the first and second endnodes are host processor endnodes containing a memory and a processor and argues that Futral does not disclose or suggest performing a remote direct memory access operation from a second host processor endnode with a second consumer process stored in a second memory of the second host processor endnode to access a contiguous memory address range accessible by a first consumer process stored in a first memory at a first host processor endnode wherein the operation includes sending the bound remote key and the first address from the

second host processor endnode to the first host processor endnode on the communication fabric. The Examiner does not agree. As shown previously by the Examiner, the "I/O device" or "I/O unit" or "host" contains a "SAN NIC" in which both devices collectively and in tandem perform these steps. Note that Futral expressly discloses that the "I/O device" or "I/O unit" or "host" contains a processor and memory (see column 3, lines 50-53) and that the "I/O device" or "I/O unit" or "host" contains a "SAN NIC" (see column 4, lines 43-50) which also inherently contains a processor and memory since it is able to perform the steps of sending the bound remote key and first address from the first host processor endnode to a second host processor endnode on a communication fabric as shown previously. Also note that Futral expressly discloses that the "SAN NIC" provides the connection to the communication fabric to the other host processor endnode that would not be possible if the SAN NIC was not within the host processor endnode (see column 4, lines 48-50). Therefore, the "I/O device" or "I/O unit" or "host" along with the "SAN NIC" collectively and in tandem perform the steps as shown in the claimed invention and are considered to be, in total, to be the "host processor endnode" as claimed. Therefore, Futral does disclose the limitations as currently amended and the claims are not in condition for allowance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 6-7, 9-13, 16-17, 19-20, 23-29, and 32-33 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 5 991 797 to Futral et al.

Regarding claim 1, Futral discloses a method of managing memory in a distributed computer system, the method comprising:

binding ("register") a remote key ("memory handle") to a first address representing a contiguous memory address range accessible by a first consumer process stored in a first memory at a first host processor endnode including a first processor and the first memory; (column 5, lines 18-42, specifically lines 24-34)

sending the bound remote key and first address from the first host processor endnode to a second host processor endnode on a communication fabric ("SAN fabric"), wherein the second

host processor endnode includes a second processor and a second memory; (column 5, lines 18-42, specifically lines 32-34) and

performing a remote direct memory access operation from the second host processor endnode with a second consumer process stored in the second memory to access the contiguous memory address range including sending the bound remote key and the first address from the second host processor endnode to the first host processor endnode on the communication fabric. (column 5, lines 18-42, specifically lines 31-42; column 7, lines 5-17)

Regarding claim 2, Futral discloses the method of claim 1 further comprising controlling local memory access protection in the first host processor endnode with a virtual memory manager in an operating system kernel process stored in the first memory. (column 4, lines 51-65; column 5, lines 6-23)

Regarding claim 6, Futral discloses the method of claim 1 wherein the first address is an effective address ("virtual address") pointing to an address space in the first memory accessible by the first consumer process. (column 3, lines 50-58; column 5, lines 5-17 and 39-56)

Regarding claim 7, Futral discloses the method of claim 6 wherein the effective address points to a virtual address space. (column 3, lines 50-58; column 5, line 43-56)

Regarding claim 9, Futral discloses the method of claim 1 wherein the first consumer process is a user process. ("application program"; column 1, lines 8-11)

Regarding claim 10, Futral discloses the method of claim 1 wherein the first consumer process is a kernel process. ("virtual interface"; column 3, lines 15-58; column 4, lines 51-65)

Regarding claim 11, Futral discloses the method of claim 1 wherein the first address is a virtual address accessible by the first consumer process which is a consumer kernel process. (column 3, lines 50-58; column 4, lines 51-65; column 5, lines 5-17 and 39-56)

Regarding claim 12, Futral discloses the method of claim 1 wherein the binding includes associating the first address to the remote key with a consumer process employing a bind remote key verb. (column 5, lines 18-42, specifically lines 29-31)

Regarding claim 13, Futral discloses the method of claim 1 further comprising obtaining at least one remote key with a consumer process employing an allocate remote key verb. (column 5, lines 18-42, specifically lines 31-32)

Regarding claim 16, Futral discloses the method of claim 1 wherein the remote key cannot be used to protect more than one memory region at a given instant. (column 5, lines 39-42)

Regarding claim 17, Futral discloses the method of claim 1 further comprising reusing the remote key after the remote direct memory access operation from the second host processor endnode is completed. (column 5, lines 23-42)

Claims 19-20, 23-29, and 32-33 are also rejected since these claims recite a distributed computer system that contains substantially the same limitations as recited in claims 1-2, 6-7, 9-13, and 16-17 respectively.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3-5, 8, 21-22, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futral et al. in view of US Patent 6 647 423 to Regnier et al.

Regarding claim 3, Futral discloses the method of claim 1.

Futral does not expressly disclose the method further comprising comparing the bound remote key and the corresponding first address supplied by the second host processor endnode to the bound remote key and corresponding first address in the first host processor endnode, however, Futral does disclose using the bound remote key and the corresponding first address

for validation purposes (column 5, lines 32-42; column 7, lines 17-34, specifically lines 26-34)

Regnier does disclose comparing the bound remote key and the corresponding first address supplied by the second host processor endnode to the bound remote key and corresponding first address in the first host processor endnode (column 5, line 66-column 6, line 61, specifically column 6, lines 35-44 and 54-61)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of these references since Regnier discloses that comparing the bound remote key and corresponding first address supplied by the second host processor endnode to the bound remote key and corresponding first address in the first host processor endnode enables verification that the information to be transferred is correct and prevents transaction of data if there is a mismatch (column 5, line 66-column 6, line 61, specifically column 6, lines 35-44 and 54-61). In view of these specific advantages and that the references are directed to performing remote direct memory accesses between endnodes over a communication fabric, one of ordinary skill would have been motivated to combine these references and would have considered them to be analogous to one another based on their related fields of endeavor, which would

lead one of ordinary skill to reasonably expect a successful combination of the teachings.

Regarding claim 4, Futral and Regnier disclose the method of claim 3.

Futral does not expressly disclose wherein if the bound remote key and corresponding first address supplied by the second host processor endnode do not match the bound remote key and first address in the first host processor endnode, the second host processor endnode is not granted access to the contiguous memory address range, however, Futral does disclose using the bound remote key and the corresponding first address for validation purposes (column 5, lines 21-23 and 32-42; column 7, lines 17-34, specifically lines 26-34)

Regnier discloses that if the bound remote key and corresponding first address supplied by the second host processor endnode do not match the bound remote key and first address in the first host processor endnode, the second host processor endnode is not granted access to the contiguous memory address range (column 5, line 66-column 6, line 61, specifically column 6, lines 35-44 and 54-61).

Claim 4 is rejected since the motivations regarding the obviousness of claim 3 also apply to claim 4.

Regarding claim 5, Futral and Regnier disclose the method of claim 3.

Futral does not expressly disclose wherein if the contiguous memory address range represented by the first address bound to the remote key supplied by the second host processor endnode is invalid, the second host processor endnode is not granted access to the contiguous memory address range, however, Futral does disclose using the bound remote key and the corresponding first address for validation purposes (column 5, lines 21-23 and 32-42; column 7, lines 17-34, specifically lines 26-34)

Regnier discloses wherein if the contiguous memory address range represented by the first address bound to the remote key supplied by the second host processor endnode is invalid, the second host processor endnode is not granted access to the contiguous memory address range (column 5, line 66-column 6, line 61, specifically column 6, lines 35-44 and 54-61).

Claim 5 is rejected since the motivations regarding the obviousness of claim 3 also apply to claim 5.

Regarding claim 8, Futral discloses the method of claim 7.

Futral does not expressly disclose the method further comprising comparing the bound remote key and the corresponding first virtual address supplied by the second host processor

endnode to the bound remote key and corresponding first virtual address in the first host processor endnode and handling a page fault condition in the first host processor endnode caused by the first virtual address bound to the remote key supplied by the second host processor endnode not being previously mapped by an operating system of the first host processor endnode, however, Futral does disclose using the bound remote key and the corresponding first address for validation purposes (column 5, lines 32-42; column 7, lines 17-34, specifically lines 26-34).

Regnier discloses comparing the bound remote key and the corresponding first virtual address supplied by the second host processor endnode to the bound remote key and corresponding first virtual address in the first host processor endnode and handling a page fault condition ("memory protection fault") in the first host processor endnode caused by the first virtual address bound to the remote key supplied by the second host processor endnode not being previously mapped by an operating system of the first host processor endnode (column 5, line 66-column 6, line 61, specifically column 6, lines 35-44 and 54-61).

Claim 8 is rejected since the motivations regarding the obviousness of claim 3 also apply to claim 8.

Claims 21-22 and 25 are also rejected since these claims recite a distributed computer system that contains substantially the same limitations as recited in claims 4-5 and 8 respectively.

Claims 14-15, 18, 30-31, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futral et al. in view of US Patent 6 360 220 to Forin.

Regarding claim 14, Futral discloses the method of claim 1.

Futral does not expressly disclose the method further comprising unbinding the remote key from the first address with a consumer process employing an unbind remote key verb, however, Forin does disclose this limitation (column 21, line 66-column 22, line 19, specifically column 22, lines 16-19) (see also Figure 8)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of these references since Forin discloses that unbinding the remote key enables the remote key that is no longer needed to be removed to allow for other remote keys to be stored (column 23, lines 29-32). In view of these specific advantages and that the references are directed to using binded remote keys in order to transfer data over a communication fabric using a consumer process, one of ordinary skill would have been motivated to

combine these references and would have considered them to be analogous to one another based on their related fields of endeavor, which would lead one of ordinary skill to reasonably expect a successful combination of the teachings.

Regarding claim 15, Futral discloses the method of claim 13.

Futral does not expressly disclose the method further comprising retiring at least one remote key that was previously obtained via the allocate remote key verb with the consumer process employing a deallocate remote key verb, however, Forin does disclose this limitation (column 21, line 66-column 22, line 19, specifically column 22, lines 16-19) (see also Figure 8 and 10)

Claim 15 is rejected since the motivations regarding the obviousness of claim 14 also apply to claim 15.

Regarding claim 18, Futral discloses the method of claim 1.

Futral does not expressly disclose the method further comprising disabling a translation for the remote key after the remote key is used for the remote direct memory access operation from the second host processor endnode, however, Forin does disclose this limitation (column 21, line 66-column 22, line 19, specifically column 22, lines 16-19) (see also Figure 8)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of these references since Forin discloses that disabling a translation for the remote key after the remote key is used for the remote direct memory access operation from the second host processor endnode enables the remote key to be removed to allow for other remote keys to be stored (column 23, lines 29-32). In view of these specific advantages and that the references are directed to using binded remote keys in order to transfer data over a communication fabric using a consumer process, one of ordinary skill would have been motivated to combine these references and would have considered them to be analogous to one another based on their related fields of endeavor, which would lead one of ordinary skill to reasonably expect a successful combination of the teachings.

Claims 30-31 and 34 are also rejected since these claims recite a distributed computer system that contain substantially the same limitations as recited in claims 14-15 and 18 respectively.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Neurauter, Jr. whose telephone number is (571) 272-3918. The

examiner can normally be reached on Monday through Friday from 9AM to 5:30PM Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wiley can be reached on (571) 272-3923. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

George C. Neurauter, Jr.
Patent Examiner
Art Unit 2143